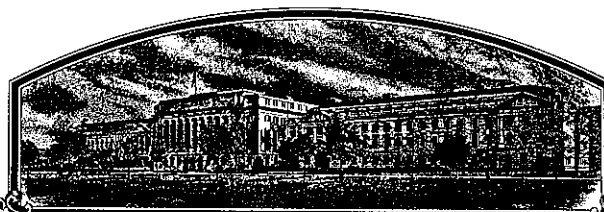


No.

8500199



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Nickerson American Plant Breeders, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT.

THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS SEEDS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Thunderbird'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D. C. this 29th day of April in the year of our Lord one thousand nine hundred and eighty-eight.

Attest:

Kenneth H. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Richard E. Lyng
Secretary of Agriculture



'Thunderbird'

APPROVAL EXPIRES 4-30-85

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

FORM APPROVED: OMB NO. 0581-0055

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

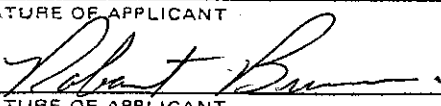

1. NAME OF APPLICANT(S) Nickerson American Plant Breeders Inc.		2. TEMPORARY DESIGNATION NAHW81-459 or APHW81-459		3. VARIETY NAME Thunderbird	
4. ADDRESS (Street and No. or R.F.D. No., City, State, and Zip Code) 5201 Johnson Drive, P.O. Box 2955 Mission, KS 66201		5. PHONE (Include area code) 913-384-4940 KS 303-532-3721 CO		FOR OFFICIAL USE ONLY PVPO NUMBER 8500199	
6. GENUS AND SPECIES NAME Triticum aestivum		7. FAMILY NAME (Botanical) Gramineae		FILING DATE Aug. 12, 1985 TIME 2:00 <input type="checkbox"/> A.M. <input checked="" type="checkbox"/> P.M.	
8. KIND NAME Hard Red Winter Wheat		9. DATE OF DETERMINATION 1) Fall of 1980 2) Fall of 1983		AMOUNT FOR FILING \$ 1,800 DATE 8/12/85 AMOUNT FOR CERTIFICATE \$ 200.00 DATE March 17, 1988	
10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION (Corporation, partnership, association, etc.) Corporation				12. DATE OF INCORPORATION January 19, 1983	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION Delaware				13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS R. E. Heiner P.O. Box 2955 Mission, KS 66201 (913) 384-4940 R. F. Bruns or C. L. Bruns P.O. Box 30 Berthoud, CO 80513 (303) 532-3721 PHONE (Include area code):	
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED a. <input checked="" type="checkbox"/> Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.) b. <input checked="" type="checkbox"/> Exhibit B, Novelty Statement. c. <input checked="" type="checkbox"/> Exhibit C, Objective Description of Variety (Request form from Plant Variety Protection Office.) d. <input checked="" type="checkbox"/> Exhibit D, Additional Description of Variety. e. <input checked="" type="checkbox"/> Exhibit E, Statement of the Basis of Applicant's Ownership. <input checked="" type="checkbox"/> f. Exhibit F, Quality and Statistical Data					
15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act.) <input checked="" type="checkbox"/> Yes (If "Yes," answer items 16 and 17 below) <input type="checkbox"/> No					
16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? <input checked="" type="checkbox"/> Foundation <input checked="" type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified		
18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.? <input type="checkbox"/> Yes (If "Yes," give date) <input checked="" type="checkbox"/> No					
19. HAS THE VARIETY BEEN RELEASED, OFFERED FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRIES? <input type="checkbox"/> Yes (If "Yes," give names of countries and dates) <input checked="" type="checkbox"/> No					
20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable. The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT 				DATE 7-29-85	
SIGNATURE OF APPLICANT 				DATE 7-31-85 1	

Exhibit A
Origin and Breeding History of Thunderbird

PEDIGREE: Selection from bulked population of adapted by winterhardy parent crosses.

DATE OF CROSS: 1975

HISTORY: The history of Thunderbird started in 1975 with a traditional crossing block. F1 of the crosses were grown out in 1976. In 1977 each cross was evaluated as an F2 population. In order to carry a large genetic base forward in the program, a number of these crosses with adapted by winterhardy parents were bulked together and designated as winterhardy bulk. This bulk was grown at several locations in the Great Plains, harvested, and mass selected for seed filling using the gravity table. Individual F4 plants were selected in 1979. These selections were observed at three locations in 1980. The best of these selections were advanced into yield trials in 1981. One of these selections was designated HW81-459. In 1983, 100 head-rows were grown to make up the original Breeders seed. The name Thunderbird was appointed in 1985.

Thunderbird is uniform and stable. Less than 1% of the plants were rogued from the foundation fields in 1983. Approximately 90% of these rogued plants were 3 to 12 centimeters taller than Thunderbird. Less than .5% of these taller plants may be encountered in subsequent generations.

Exhibit B

Novelty Statement

Thunderbird is most similar to the hard red winter wheat Arkan, but it can easily be distinguished by the following morphological characteristics:

- Thunderbird expresses auricle anthocyanin. Arkan is patented as not expressing auricle anthocyanin.
- Thunderbird does not express hairs of the 1st leaf sheath. Arkan is patented as having hairs on the 1st leaf sheath.
- Thunderbird's beak shape is classified as acute. Arkan's beak shape is classified as acuminate.
- Thunderbird's juvenile growth habit is semi-erect. Arkan's juvenile growth habit is patented as prostrate.
- Thunderbird has a glume width that falls in the medium category. Arkan has a glume width that falls into the narrow category (see statistical data).
- Thunderbird's seed express rounded cheeks, and narrow and shallow seed crease characteristics. Arkan's seed is patented as having angular cheeks, and mid-wide and mid-deep seed crease characteristics.

8500199

A.N.O.V.A. Table for Glume Width

Thunderbird vs. Arkan

<u>Source</u>	<u>df</u>	<u>ss</u>	<u>ms</u>
Total	49	32.98	
Var	1	8.32	8.320
Error	48	24.66	.513

F test = 16.22**

<u>Var</u>	<u>Mean</u>
Thunderbird	3.6 mm
Arkan	2.8 mm

** The probability that the means for glume width
are significantly different at the 1% alpha level.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (TRITICUM SPP.)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

Nickerson American Plant Breeders Inc.

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

5201 Johnson Drive, P.O. Box 2955
Mission, KS 66201

FOR OFFICIAL USE ONLY

PVPO NUMBER 8500199

VARIETY NAME OR TEMPORARY DESIGNATION

THUNDERBIRD

Place the appropriate number that describes the varietal character of this variety in the boxes below.

Place a zero in first box (e.g., 089 or 09) when number is either 99 or less or 9 or less.

1. KIND:

1 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

2 1 = SPRING 2 = WINTER 3 = OTHER (Specify) 1 = SOFT 3 = OTHER (Specify)
2 2 = HARD

2 1 = WHITE 2 = RED 3 = OTHER (Specify)

3. SEASON - NUMBER OF DAYS FROM ~~planting~~ TO:

2 3 4 FIRST FLOWERING 2 4 0 LAST FLOWERING

4. MATURITY (50% Flowering):

SAME MATURITY AS SCOUT
- - NO. OF DAYS EARLIER THAN 2 1 = ARTHUR 2 = SCOUT 3 = CHRIS
- - NO. OF DAYS LATER THAN 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

0 9 9 CM. HIGH
- - CM. TALLER THAN -
0 6 CM. SHORTER THAN 2 1 = ARTHUR 2 = SCOUT 3 = CHRIS
4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

2 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHUR COLOR:

1 1 = YELLOW 2 = PURPLE

8. STEM:

1 Anthocyanin: 1 = ABSENT 2 = PRESENT 2 Waxy bloom: 1 = ABSENT 2 = PRESENT
2 Hairiness of last internode of rachis: 1 = ABSENT 2 = PRESENT 1 Internodes: 1 = HOLLOW 2 = SOLID
0 5 NO. OF NODES (Originating from node above ground) 2 5 CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

2 Anthocyanin: 1 = ABSENT 2 = PRESENT 2 Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

1 Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 2 Flag leaf: 1 = NOT TWISTED 2 = TWISTED
3 = OTHER (Specify): 1 Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT 2 Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT
1 2 MM. LEAF WIDTH (First leaf below flag leaf) 2 6 CM. LEAF LENGTH (First leaf below flag leaf)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

Exhibit D

Additional Description of Thunderbird

Thunderbird is a hard red winter wheat tested as NAHW81-459 or APHW81-459. It was bred and developed by Nickerson American Plant Breeders Inc.

Thunderbird is an intermediate height variety with very strong straw strength characteristics, intermediate maturity and very good winterhardiness. Milling and baking properties are good.

Juvenile plant growth habit is semi-erect. Plant color is green with an erect, twisted flag leaf. Head shape is tapering to strap, middense awned and white at maturity. Glumes are short in length and of medium width with oblique shoulders and acute beaks. Seed shape is ovate to elliptical with rounded cheeks and midlong brush hairs.

Thunderbird has some very unusual and beneficial characteristics that will enable it to be accepted by the farmers over a large geographic area. Thunderbird's long coleoptile, fast fall establishment, winterhardiness, and excellent test weight patterns will make it a very desirable candidate for dryland production throughout the western and northern HRW region. Its excellent disease resistance and strong straw make it a good choice for "upland" production in the central and eastern HRW regions.

WHEAT

CLASS: Hard Red Winter

NAME: Thunderbird

NOMENCLATURE: Triticum aestivum

P.I. NO.:

RELEASED: 1986

REGISTRATION NO.:

SELECTION NO.: NAHW81-459 or APHW81-459

PEDIGREE: A selection from a bulk population derived from crosses of winter-hardy and adapted parents.

CULTIVAR DESCRIPTION: Thunderbird is an intermediate height variety with very strong straw strength characteristics, intermediate maturity and very good winterhardiness. Milling and baking properties are good. Juvenile plant growth habit is semi-erect. Plant color is green with an erect, twisted flag leaf. Head shape is tapering to strap, middense, awned and white at maturity. Glumes are short in length and of medium width with oblique shoulders and acute beaks. Seed shape is ovate to elliptical with rounded cheeks and midlong brush hairs.

ADAPTATION AND CHARACTERISTICS: Thunderbird has some very unusual and beneficial characteristics that will enable it to be accepted by the farmers over a large geographic area. Thunderbird's long coleoptile, fast fall establishment, winterhardiness, and excellent test weight patterns will make it a very desirable candidate for dryland production throughout the western and northern HRWW region. Its excellent disease resistance and strong straw make it a good choice for "upland" production in the central and eastern HRW regions.

GENERAL INFORMATION: Thunderbird is most similar in appearance to the HRWW variety Arkan. The noticeable field differences are Thunderbird has a medium glume width while Arkan's is narrow. Thunderbird's beak is acute while Arkan's is classified as acuminate.

OTHER SOURCES OF INFORMATION: Nickerson American Plant Breeders Inc.
5201 Johnson Drive
Mission, KS 66201

EXHIBIT E.

Statement of the Basis of Applicant's Ownership

Nickerson American Plant Breeders Inc. is the applicant for protection in this case being:

- a) the incorporated business (registered in Delaware) for and within which regular employees have bred the named variety.
- b) the proprietary owner and intending commercial user of the variety.

Nickerson American Plant Breeders Inc.

YEAR: 1984

HARD RED WINTER WHEAT QUALITY

PAGE 1

YEAR	SAMPLE NAME	LOC	WHEAT--FLOUR QUALITY										BAKING QUALITY										TOTAL SCORE
			TEST WT.	WHT PROT	14%mb	%	FLR YLD	FLR PROT	FLR ASH	MIX CURVE	ABS. %	MIX TIME	CHAR R	DOUGH VOL	GRUMB			MILL SCORE	BAKE SCORE				
															BRN	TEX	COL						
			lb/Bu	14%mb	%	14%mb	%	14%mb	%	R	min	R	cc	R	R	R	R						
83	Thunderbird	SK	61.3	13.9	69.2	12.1	0.462	6	61.0	3.5	8	910	8	8	8	82-B	83-B	163-B					
83	Thunderbird	SN	62.4	14.2	69.0	12.4	0.447	6	64.0	2.8	8	850	7	9	8	82-B	83-B	163-B					
83	Thunderbird	BB	54.3	12.3	68.9	11.6	0.471	7	62.0	3.8	7	850	7	7	8	67-D	79-C	144-C					
84	Thunderbird	SO	58.4	12.7	72.1	11.6	0.491	7	63.0	3.8	8	1000	7	8	8	83-B	89-B	172-B					
84	Thunderbird	SO	59.1	12.1	74.2	10.4	0.000	4	59.0	4.0	7	950	8	9	8	70-C	80-B	150-C					
84	Thunderbird	OI	61.7	15.6	73.6	12.9	0.468	6	65.0	2.8	8	960	8	9	8	89-B	87-B	176-B					
84	Thunderbird	BB	63.0	13.5	73.6	11.9	0.000	5	63.0	2.5	8	1000+	8	8	9	83-B	86-B	163-B					
	AVERAGE		60.1	13.5	71.2	11.8	0.468	6	62.4	3.3	8	933	8	8	8	84-B	83-B	167-B					
83	NEWTON	SK	58.2	11.9	69.0	10.0	0.424	6	60.0	4.3	8	875	8	8	9	67-D	80-B	147-C					
83	NEWTON	SN	59.4	14.3	69.9	13.1	0.434	7	65.0	3.0	7	1000	9	8	8	82-B	89-B	171-B					
83	NEWTON	BB	40.5	12.4	60.3	11.0	0.448	7	62.0	4.5	7	1000	8	8	9	60-D	88-B	148-C					
84	NEWTON	SO	55.4	12.0	69.6	10.8	0.399	4	59.0	4.9	8	920	8	8	7	60-D	79-C	128-D					
84	NEWTON	SO	56.9	11.5	70.2	10.3	0.000	3	59.0	5.5	7	900	8	7	8	57-F	71-C	123-D					
84	NEWTON	GI	57.5	14.0	70.3	11.5	0.433	6	63.0	3.5	8	925	9	9	9	77-C	83-B	166-B					
84	NEWTON	BB	61.3	12.5	71.7	11.2	0.000	7	66.0	2.5	7	960	9	8	8	83-B	86-B	169-B					
	AVERAGE		56.6	12.7	69.6	11.1	0.429	6	61.9	4.0	7	940	8	9	9	69-D	82-B	151-C					

GRADES: A-EXCELLENT B-GOOD C-ACCEPTABLE D-QUESTIONABLE F-UNACCEPTABLE
 R-RATINGS 9-10-EXCELLENT 8-GOOD 7-ACCEPTABLE 5-6-QUESTIONABLE 1-4-UNACCEPTABLE